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(71) Applicant and

(72) Inventor: **SEVERI, Paolo** [IT/TT]; Via Campoleone  
Tenuta, 7, I-04010 Aprilia (IT).

(74) Agents: **LEONE, Mario et al.**; Società Italiana Brevetti  
S.p.A., Piazza di Pietra, 39, I-00186 Roma (IT).

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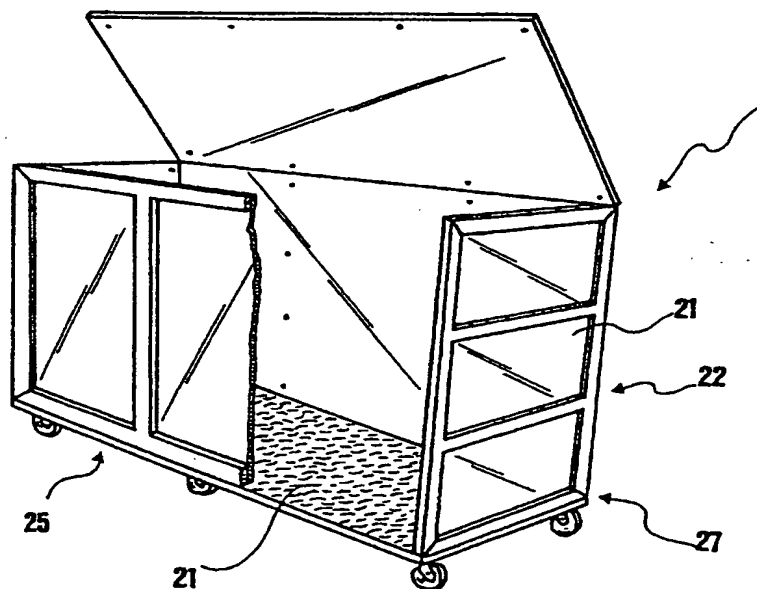
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(54) Title: **MODULAR PACKAGING ASSEMBLY**



(57) Abstract: Modular packaging assembly (1), adjustable to the dimensions of the product to be packaged, light and structurally stable, comprising a plurality of panels (24, 25, 26, 27, 28) apt to be assembled for forming a packaging container, each panel comprising a covering sheet (21) and a framework (22) of a light metallic material for supporting the covering sheet and connecting the panels among them, wherein the framework has rods (221) and joints (222, 223), interposed between the rods and being connected thereto with reversible fixing means (3).

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## MODULAR PACKAGING ASSEMBLY

### Description

The present invention relates to a modular packaging assembly. In particular, this invention relates to an assembly comprising a plurality of panels apt to be assembled for forming a packaging container, each panel of said plurality of panels comprising a covering sheet and a framework.

In the field of packaging and transportation of delicate products, such as e.g., rich fabrics, works of art, technological equipment, musical instruments and so on, several types of packaging containers are known.

Typically, such packaging containers consist of wooden cases. These are made of panels that are arranged so as to form a substantially parallelepipedal-shaped container, each panel forming a wall thereof. Cushioning means can be housed inside such cases in order to cushion the impacts of the packaged product with the panels of the case itself.

Contiguous panels forming the case are connected among them with traditional connecting means, such as nails, screws and/or hinges.

Some cases further provide the application of metal profiles at the edges of the case itself, for stiffening it and connecting the panels among them.

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Furthermore, in fields of the art analogous to the  
aforementioned one, e.g., that of food packaging and  
transportation, plastic and/or metal cases are known,  
such as the ones disclosed in WO 9215506 and DE 4218408.

5 Such plastic and/or metal cases have a structure  
analogous to that of the aforementioned wooden cases.

The abovedescribed packaging systems of the known art  
entail some relevant drawbacks.

First of all, in order to obtain an optimal packaging,  
10 both the wooden cases and the plastic and/or metal ones  
have to be designed and manufactured for each specific  
dimension of the product to be packaged. This entails a  
complication in the manufacturing process of the cases  
themselves, as well as a considerable expenditure. Owing  
15 to that, such cases are often manufactured in a certain  
number of standard formats only, unavoidably entailing a  
non-optimal packaging of products having intermediate  
dimensions between those of two subsequent standard  
formats.

20 Moreover, the packaging cases presently adopted do not  
achieve an optimal compromise between the case weight and  
the strength thereof.

The technical problem underlying the present invention is  
that of providing a modular packaging assembly allowing  
25 to overcome the drawbacks hereto mentioned with reference  
to the known art.

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This problem is overcome by means of a modular packaging assembly, comprising a plurality of panels apt to be assembled for forming a packaging container, each panel of said plurality of panels comprising a covering sheet  
5 and a framework of a light metallic material for supporting said covering sheet and connecting the panels of said plurality of panels among them, said framework having rods and joints, interposed between said rods and connected thereto by reversible fixing means.

10 Preferred features of the present invention are disclosed in the dependent claims thereof.

The present invention provides some relevant advantages. First of all, the aforesaid reversible fixing means of the framework allows to form modular panels that are  
15 easily adjustable to the dimensions of the product to be packaged, thus simplifying the manufacture of the panel itself, and therefore of the packaging container as a whole.

Moreover, the light metal framework provides strength and  
20 stability to the panel, thereby enabling to obtain an optimal compromise between the weight of the packaging container and the strength thereof. In particular, obtaining packaging containers of remarkable dimensions, yet light and structurally stable, becomes possible.

25 Other advantages, features, and modes of use of the present invention will hereinafter be apparent in the

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following detailed description of an embodiment thereof, given by way of example and not for limitative purposes. Reference will be made to the figures of the annexed drawings, wherein:

5 Figure 1 is a partially exploded perspective view of a first embodiment of a packaging assembly according to the present invention;

Figure 2 relates to a first detail of the packaging assembly of Figure 1, showing a part of a framework of  
10 said assembly;

Figures 3A, 3B and 3C relate to a second, to a third and to a fourth detail, respectively, of the packaging assembly of Figure 1, each showing a respective closure system of said assembly;

15 Figures 4A, 4B and 4C each relate to a respective embodiment of a handling device of the packaging assembly according to the invention, showing perspective views thereof; and

Figure 5 relates to a perspective view of the packaging assembly of Figure 1 in an assembled condition.  
20

With reference to Figure 1, a modular packaging assembly is globally indicated with 1. Such assembly comprises a plurality of panels, apt to be assembled to form a packaging container. Each panel comprises a covering  
25 sheet 21 and a framework 22, made of a light metallic material, to support the covering sheet 21 and connect

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the panels of the aforesaid plurality among them. The framework 22 comprises rods, each indicated with 221, and joints interposed among such rods 221. The joints and the rods 221 are interconnected with reversible fixing means 3, as it will be disclosed hereinafter in greater detail with reference to Figure 2.

Further referring to Figure 1, in the present embodiment the packaging assembly 1 comprises six panels, apt to be assembled into a substantially parallelepipedal-shaped packaging container. In particular, each panel is apt to form one wall of the aforesaid packaging container. For greater ease of description and purely by way of example, it will be hereinafter useful to refer to two side panels, each indicated with 24, to a bottom panel 25, apt to rest on a supporting plane, to a top panel 26, apt to be arranged above the packaging container, to a front panel 27 and to a rear panel 28.

In the present embodiment, the covering sheet 21 of each panel is substantially shaped as a flattened parallelepiped, and therefore has two front dimensions larger than the thickness thereof. It is apparent that the shape of the covering sheet 21, also determining the shape of the related panel, may vary in order to meet the specific packaging and/or transportation requirements.

Moreover, the covering sheet 21 can be made of various materials. Preferably, it will be made of a light

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material, e.g., plastics. In case of standard packaging, a panel of honeycomb polypropylene may be used, of a thickness suiting the strength requirements of the packaging itself.

5 Alternatively, in order to satisfy particular needs, the covering sheet 21 can be made of honeycomb Aluminium. This material ensures a suitable strength to shearing/torsional stresses as well as to shocks, together with fire-proof properties.

10 Further, the covering sheet 21 can be of a so-called sandwich-like layer structure. In particular, this can be made of one inner polyethylene layer and two outer Aluminium layers.

To reach an optimal compromise between capacity of  
15 protection of the packaged product, strength and ease of manufacturing, preferably the thickness of the covering sheet 21 will be comprised in the interval between 2 and 15 mm, more preferably, in the interval between 4 and 12 mm. More preferred embodiments provide such thickness to  
20 be of 5 mm, 9 mm or 12 mm.

The covering sheet may also be made so as to have heat insulation or soundproof properties, or peculiar optical or anti-burglary properties. Further, wooden covering  
25 sheets can be provided as well, in order to satisfy specific aesthetic requirements.

However, as already the shape, also the material, the

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thickness and the colour of the covering sheet will be determined by the specific requirements of the type of product to be packaged, and by the transportation modalities thereof.

5 For instance, two or more covering sheets of different materials can be juxtaposed in the same panel. Moreover, in particular instances, different thicknesses and/or materials of the covering sheet can be provided for different panels of the same packaging container. For  
10 instance, as it is shown in Figure 5, the bottom panel 25 can have a covering sheet 21 of sheet metal, increasing the strength thereof and making it suitable to the application of handling devices to the packaging container. Such handling devices will be disclosed in  
15 greater detail in the following.

Each covering sheet 21 may be fixed to the remaining section of the related panel, i.e., to the framework 22, with traditional adhesive means, e.g., hot melt glues. Alternatively, when an interchangeability of the covering  
20 sheet itself is required, it can be connected to the framework 22 by reversible connecting means. Such reversible connecting means can be connection means of a traditional type, such as, e.g., screws and corresponding seats, or sections of biadhesive tape. The aforesaid  
25 interchangeability of the covering sheets is highly useful, since this, together with the packaging assembly



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modularity, allows a reuse of the same framework for the packaging and the transportation of products having different packaging needs, as it will also be appreciated hereinafter.

5 The framework 22 of a panel will herein be described in greater detail, with reference to Figure 2.

The joints have tongue ends 225. The rods 221 have grooves 224, each hollow-shaped and apt to receive a corresponding tongue end 225. Therefore, each groove 224  
10 of a rod 221 and the corresponding tongue end 225 of a joint form the reversible fixing means 3 between the rod 221 and the related joint.

In particular, each rod 221 can easily be manufactured in the shape of a tubular member, therefore hollow, and thus  
15 said grooves 224 can consist merely in the two end portions of the tubular member itself.

The assembly 1 provides grooves 224 and tongue ends 225 having substantially equal cross sections. Thus, according to the invention, anyone of the tongue ends 225  
20 of anyone of the joints is apt to be inserted in anyone of the grooves 224 of anyone of the rods of the assembly 1, according to a logic of complete interchangeability of the rods 221 and of the joints, thereby providing a complete modularity of the assembly 1 itself.

25 In the present embodiment, the joints and the rods 221 have a substantially quadrilateral cross section. Of

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course, alternative embodiments may provide different shapes. Likewise, in the present embodiment the rods develop along a substantially rectilinear path. However, in order to satisfy specific aesthetic and/or packaging needs, both the rods and the joints may have configurations differing from the ones hereto described.

In Figure 2, a first joint 222 is substantially L-shaped. Such first joint 222 is apt to be located at one vertex of the related panel, as indicated in Figure 1.

Continuing with Figure 2, a second joint 223 is instead substantially T-shaped. Such second joint 223 is apt to be located on the related panel in an intermediate location between two vertexes of the packaging container, as indicated in Figure 1.

The modalities according to which the rods 221 are located on each panel will now be made apparent. In particular, referring again to Figure 1, the rods 221 and the first joints 222 of a panel form a frame located over the entire perimetral surface of the related covering sheet 21. Moreover, the second joints 223 enable the stiffening of the panel even at the intermediate areas thereof, allowing the positioning of the rods 221 transversally to and/or lengthways the panel itself. In the present embodiment, the rods 221 are solely located transversally to the covering sheet 21, i.e., parallelly to a smaller front dimension thereof. This positioning

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allows an effective panel stiffening. In alternative embodiments, such rods 221 can be located lengthways the covering sheet 21, i.e., parallelly to a larger front dimension thereof. Moreover, in order to meet specific packaging and transportation needs, and in particular to further stiffen the panel, both longitudinal and cross rods can be provided, connected by substantially cross-shaped intermediate joints.

Moreover, the rods 221 could be located according to an even spacing, as in the side panels 24 of Figure 1, or according to a variable spacing, as in the front panel 27 of Figure 1.

Packagings having different strengths to mechanical stresses can be obtained by varying the texture of the rods 221, as well as the section thereof and the section of the joints 222, 223.

Of course, also joints with a merely rectilinear profile can be provided, hence having two aligned tongue ends 225, for connecting, e.g., two rods 221 aligned along the same side of the panel.

The rods 221 and the joints 222, 223 of the framework 22 can be extruded. Preferably, such rods 221 and joints 222, 223 are made of Aluminium or of an alloy thereof.

In order to satisfy specific packaging and transportation needs, the joints can have a plastic outer covering sheathing the inner metallic core.

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Moreover, in order to improve the panel resistance to mechanical and chemical actions, preservatives can advantageously be applied onto the framework 22 and/or the covering sheet 21.

5 It will be appreciated that, as hinted above, the use of a skeleton, made by the framework 22, allows an easy fixing of covering sheets 21 of various materials and properties. In particular, the fact that the framework 22 is made of metal eases the implementation of the  
10 reversible connection between the covering sheet 21 and the framework 22 itself. In fact, the framework 22 can easily be prearranged for using traditional reversible connecting means, such as screws and the like. For instance, suitable seats such as evenly spaced threaded  
15 holes can be machined into the framework.

It will also be appreciated how the structure and the material used for the panels make extremely simple and cost-effective the manufacturing thereof.

As hereto mentioned, the framework 22 also implements a  
20 fixed connection between contiguous panels. With reference to Figures 3A, 3B and 3C, the panels apt to make contiguous walls of said parallelepipedal-shaped packaging container can be fixedly connected with closure systems. Those closure systems are susceptible of  
25 different embodiments, possibly coexisting within the same packaging assembly. For instance, in the present

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embodiment, three embodiments of the aforesaid closure systems coexist, as it will be illustrated hereinafter.

A first closure system is of the lever type, and it is preferably used for connecting the side panels 24, the front panel 27, or the rear panel 28 with the top panel 26. Preferably, such lever closure systems are connected to the panel framework with traditional reversible connecting means, e.g., screws and the like, likewise what described for the covering sheets 21. Two possible embodiments of such lever closure system are represented in Figures 3A and 3B, respectively.

With reference to Figure 3A, a first lever closure system, indicated with 4, comprises a first member 41 fixed to one of the two panels to be connected, in particular to the top panel 26, with traditional reversible connecting means. More specifically, such first member 41 will be fixed to a rod or to a joint of the top panel 26. Moreover, the lever closure system 4 comprises a second member 42, movable with respect to the first member 41. In particular, such second member 42 is rotatably connected to the first member 42 by a hinge 43. Such second member 42 is apt to be gripped and rotated by a user, in order to be accommodated into a seat, e.g., on a side panel 24, and in particular on a rod or a joint thereof. Due to this rotation the top panel 26 is fixed to the side panel 24.

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A second embodiment of a lever closure system is shown in Figure 3B. This second lever closure system, here indicated with 5, comprises an elongated body, also indicated with 5, hinged to one of the two panels to be connected, particularly on the side panel 24. More specifically, the elongated body 5 is hinged to a rod or joint of the side panel 24.

The elongated body 5 has a hook-shaped end 51. The elongated body 5 is apt to be gripped and rotated by a user, in order to put the hook-shaped end 51 into a seat of a rod or joint of the framework 22 of the top panel 26, forming a reversible coupling therewith. Therefore, by virtue of such connection, the top panel 26 is fixed to the side panel 24.

Therefore, such first and second lever closure system 4, 5 implement a reversible connection between two panels of the packaging container.

In the present embodiment a third type of closure system is provided as well, illustrated in Figure 3C. This third type of closure system simply consists of traditional reversible connecting means, indicated with 6, then also applied at the framework 22 of the panels at issue. In particular, such connecting means 6 can be threaded inserts and/or bolts, e.g., made of steel, and corresponding seats. Preferably, said connecting means 6 will be applied to fixedly connect the side panels 24,

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the front panel 27, the rear panel 28 and the bottom panel 25.

It is understood that many other embodiments may be provided for the aforesaid closure systems, possibly differing for the dimensions of the packaging container and to the required strengths. For instance, sliding hinges can be adopted in lieu of fixed ones, as well as key-locks, spring couplings, and so on. Since all of those closure systems are of a traditional type and well-known to a person skilled in the art, a further description thereof will be omitted.

Some relevant advantages are provided by the fact that all of the abovedescribed closure systems can be applied at the metal framework of the panels. First of all, as hereto mentioned, said framework can easily be prearranged for the use of traditional connecting means. Thus, the closure systems can easily be mounted and removed should this be required. Those steps can be carried out with great ease, using traditional tools, e.g., a corkscrew. Further, during use such closure systems do not come into contact with the covering sheet of the panel, typically more wearable, thereby preventing the damaging of the latter.

As it is shown in Figure 5, the packaging assembly 1 can also comprise one or more handling devices. Such handling devices can be of a traditional type, based e.g. on the

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use of wheels, stackers, forklift clutches, and general hoisting couplings.

Figures 4A, 4B and 4C each show an embodiment of a wheeled handling device. Such embodiments are indicated with 71, 72 and 73, respectively. Further referring also to the latter Figures, the one or more handling devices may be permanently fixed to the packaging assembly, and particularly to the framework 22 of the bottom panel 25, e.g. by welding. However, such handling devices, just like the aforementioned closure systems, will advantageously be removable when required. In the latter instance, each handling device is fixable to the packaging assembly 1 with reversible connecting means of a traditional type, comprising suitable seats formed onto the panel framework, as hereto illustrated.

Also the handling devices will be well-known to those skilled in the art, hence a further description thereof will be omitted.

It will now be appreciated that the packaging assembly of the present invention is fully modular, being therefore extremely versatile and effective, allowing the implementation of a wide range of assembly combinations. By virtue of the materials used for the framework and the covering sheets such combinations are anyhow light and easy to handle, even for large-sized packagings.

The aforesaid assembly combinations can provide the



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application of removable accessory components like the  
aforesaid closure systems and handling devices, and/or  
transportation hooks, impact absorbing systems, pallet  
tiles and so on. By virtue of the aforesaid pre-  
5 arrangement of the framework of each panel for the use of  
reversible connecting means, such removable accessory  
components can easily be applied and removed. This ease  
of application and removal of the various components, and  
particularly of the handling devices, further emphasises  
10 the versatility of the assembly with respect to the  
various transportation modalities and requirements.

The packing assembly 1 can also comprise a box member,  
formed on one of the panels, for housing a suitable tool,  
e.g., a corkscrew, apt to disengage said connection  
15 between contiguous panels and between the framework and  
the closure systems or the other possibly provided  
removable components.

When an anti-theft packaging is desirable, the aforesaid  
tool, obviously as well as the corresponding connecting  
20 means to be disengaged, can also be implemented with a  
particular size and shape.

It will now be appreciated that the modular packaging  
assembly according to the invention allows to implement a  
packaging method according to what will hereinafter be  
25 disclosed.

Each wall of the packaging container can be made in a

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modular form. In fact, each panel can comprise a covering sheet made in the proper size, that will be connected to a modular framework. In particular, the rods of the framework can be made starting from a single tubular member, to be divided into portions of a desired length, and the joints can be provided in standard formats. Rods and joints can then be assembled in a suitable manner and number in order to obtain an optimal packaging in terms of strength and adjustment to the dimensions of the product to be packaged. In particular, due to the aforementioned interchangeability of the rods and the joints, the dimensions of the framework, and therefore of the related packaging container, will be adapted according to the specific needs merely by assembling a different number of rods and joints. Likewise, the strength of each container panel can be modified varying the positioning and the number of rods and joints of the framework.

It will also be appreciated that the panels are interchangeable among them. For instance, in a parallelepipedal-shaped packaging container, those will be interchangeable in pairs.

In order to satisfy contingent packaging and transportation needs, in a further step of the abovedescribed method, the rods and the joints can be welded, and in particular resistance welded, at the

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aforesaid reversible fixing means, therefore making the related connection irreversible.

Hence, the packaging method can provide the application of closure and/or handling systems, and/or of other removable accessory components, according to what has hereto been described.

It will be appreciated that, by virtue of its modularity, the packaging assembly according to the present invention is of easy storage and transportation, even in a disassembled condition thereof. Thus, by virtue of the aforesaid ease of assembly, such packaging assembly could be provided to an end user in such a disassembled state.

From the hereto disclosed characteristics, it will be apparent that the packaging assembly can protect the packaged product during transportation and storage, the packing assembly not entailing problems of weight, bulkiness, strength or working life.

Moreover, the materials used can ensure the near total recycle of the packaging assembly in case of a disposal thereof.

The present invention has hereto been disclosed with reference to preferred embodiments thereof. It is understood that there may be other embodiments falling within the inventive concept, all however comprised within the protective scope of the annexed claims.

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Claims

1. A modular packaging assembly (1), comprising  
a plurality of panels (24, 25, 26, 27, 28) apt to be  
assembled for forming a packaging container,  
5 each panel of said plurality of panels comprising  
a covering sheet (21) and  
a framework (22) of a light metallic material for  
supporting said covering sheet and connecting the panels  
of said plurality of panels among them,  
10 said framework having rods (221) and  
joints (222, 223), interposed between said rods  
and connected thereto by reversible fixing means (3).
2. The assembly according to claim 1, wherein said light  
metallic material comprises Aluminium.
- 15 3. The assembly according to claim 1 or 2, wherein at  
least one panel (24, 25, 26, 27, 28) of said plurality of  
panels comprises a covering sheet (21) made of a light  
plastic material.
4. The assembly according to claim 3, wherein said light  
20 plastic material is honeycomb polypropylene.
5. The assembly according to any one of the preceding  
claims, wherein at least one panel (24, 25, 26, 27, 28)  
of said plurality of panels comprises a covering sheet  
(21) made of honeycomb Aluminium.
- 25 6. The assembly according to any one of the preceding

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claims, wherein at least one panel (24, 25, 26, 27, 28) of said plurality of panels comprises a covering sheet (21) made in a sandwich-like structure, said structure comprising one inner polyethylene layer and two outer Aluminium layers.

7. The assembly according to any one of the preceding claims, wherein said covering sheet (21) has a thickness comprised in an interval between 2 and 15 mm.

8. Assembly according to claim 7, wherein said covering sheet (21) has a thickness comprised in an interval between 4 and 12 mm.

9. The assembly according to claim 8, wherein said covering sheet (21) has a thickness equal to 5 mm, 9 mm or 12 mm.

10. The assembly according to any one of the preceding claims, wherein at least one panel (24, 25, 26, 27, 28) of said plurality of panels comprises two or more covering sheets (21) of materials differing among them.

11. The assembly according to any one of the preceding claims, wherein at least one panel (25) of said plurality of panels (24, 25, 26, 27, 28) comprises a covering sheet (21) of metallic sheet.

12. The assembly according to any one of the preceding claims, wherein said reversible fixing means (3) comprises tongue ends (225) formed onto each of said joints (222, 223), and grooves (224) formed onto each of

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said rods (221), said grooves being apt to receive corresponding tongue ends.

13. The assembly according to any one of the preceding claims, wherein at least one panel (24, 25, 26, 27, 28) of said plurality of panels comprises substantially L-shaped joints (222).

14. The assembly according to any one of the preceding claims, wherein at least one panel (24, 25, 26, 27, 28) of said plurality of panels comprises substantially T-shaped joints (223).

15. The assembly (1) according to any one of the preceding claims, wherein at least one panel (24, 25, 26, 27, 28) of said plurality of panels comprises substantially cross-shaped joints.

16. The assembly according to any one of the preceding claims, wherein said joints (222, 223) have an outer plastic covering.

17. The assembly according to any one of the claims 1 to 16, wherein said covering sheet (21) is supported by said framework (22) by reversible connecting means.

18. The assembly according to claim 17, wherein said covering sheet (21) is supported by said framework (22) with biadhesive tape.

19. The assembly according to any one of the preceding claims, comprising removable accessory components (4, 5, 71, 72, 73) apt to be connected with said framework (22)

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by reversible connecting means.

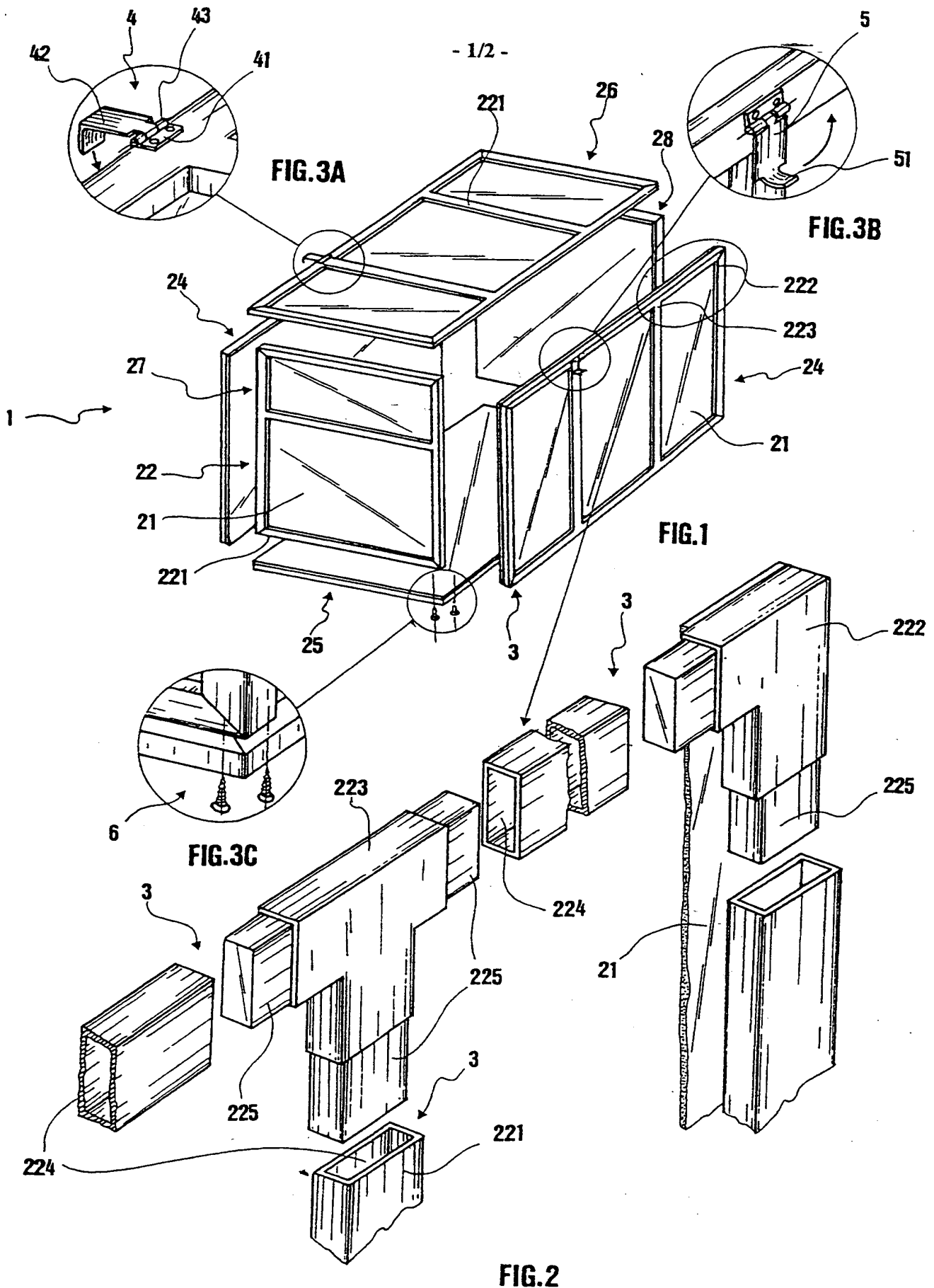
20. The assembly according to claim 17 or 19, wherein said framework (22) has suitable seats, positioned thereto with even spacing.

5 21. The assembly according to claim 20, comprising a box member, formed onto at least one panel (24, 25, 26, 27, 28) of said plurality of panels, for housing a tool apt to disengage said reversible connecting means.

10 22. The assembly according to any one of the preceding claims, comprising lever closure systems (4, 5) to connect panels (24, 25, 26, 27, 28) of said plurality of panels apt to form contiguous walls of said packaging container.

15 23. The assembly according to any one of the preceding claims, comprising one or more handling devices (71, 72, 73) of said packaging container.

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- 2/2 -

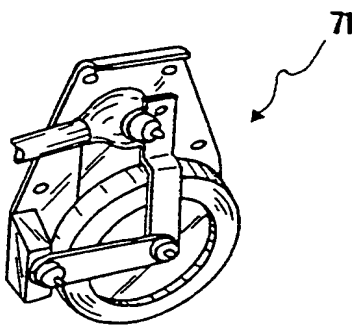


FIG. 4A

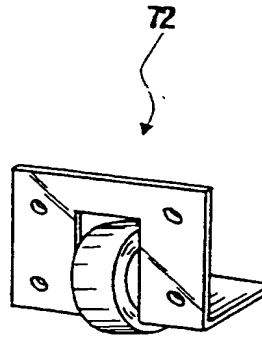


FIG. 4B

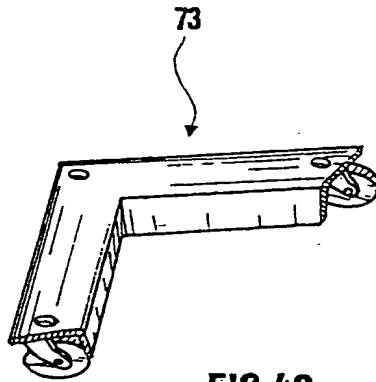


FIG. 4C

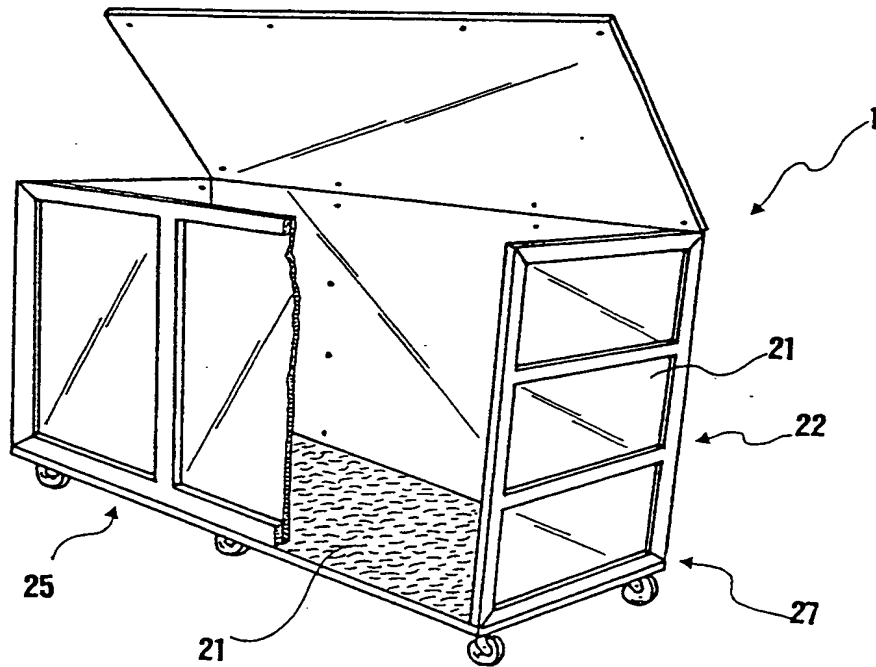


FIG. 5

# INTERNATIONAL SEARCH REPORT

International Application No

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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B65D90/02 B65D90/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 147 172 A (W.CALLISTER) 2 April 1969 (1969-04-02) page 1, line 19 - line 40 page 1, line 76 -page 2, line 20; figure 1	1,2, 11-15
A	FR 1 433 566 A (P.A.CHAUVELIER) 15 June 1966 (1966-06-15) the whole document	1,12,13, 17
A	US 3 561 633 A (MORRISON ROBERT S ET AL) 9 February 1971 (1971-02-09)	

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Zanghi, A

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/IT 00/00011

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